State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

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To: DES DEPUTY DIVISION CHIEFS

Date: May 12, 2009

From: KEVIN THOMPSON
Structures Transportation Policy Board Chair

Subject: Revised Policy on Design of Type II Shafts

Caltrans' Seismic Design Criteria (SDC) 8.2.4 provides guidance on the "Development Length for Column Reinforcement Extended into Enlarged Type II Shafts". Under some circumstances the current criteria can result in long column embedment lengths, particularly for large diameter columns, which can create constructability complications. Based on a recently completed analytical study, SDC 8.2.4 is modified as follows:

> ***SDC 8.2.4 Development Length for Column Reinforcement Extended into Enlarged Type II Shafts***
>
> *Column longitudinal reinforcement shall be extended into Type II (enlarged) shafts in a staggered manner with the minimum recommended embedment lengths of* $(D_{c,\max} + l_d)$ *and* $(D_{c,\max} + 2 \times l_d)$*, where* $D_{c,\max}$ *is the largest cross section dimension of the column, and* l_d *is the development length in tension of the column longitudinal bars. The development length* l_d *shall be determined by multiplying the basic tension development length* l_{db} *as specified in AASHTO LRFD Section 5.11.2.1 by the compounded modification factors of 0.9 and 0.6 for epoxy-coated and non epoxy-coated reinforcement, respectively. Nominal values of* $f_y = 68$ *ksi and* $f_c' = 5$ *ksi shall be used in calculating* l_{db}*.*
>
> *In addition to ensuring adequate anchorage beyond the plastic hinge penetration into the shaft, this provision will ensure that the embedment lengths for a majority of bridge columns supported on Type II shafts are less than 20 ft. Construction cost increases significantly when embedment lengths exceed 20 ft as the shaft excavations are governed by the more stringent Cal-OSHA requirements for tunneling and mining.*

As discussed and approved by the Structures Transportation Policy Board on April 28, 2009, this change is effective immediately and will be included with the publication of the next version of Caltrans SDC. Please distribute this memorandum within your

Subdivision as appropriate. If you have any questions regarding this change, contact Mark Mahan at (916) 227-8404.

c: Mark Mahan, Senior Bridge Engineer